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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09 986,175 | 11 07 2001 | Chih-Chin Chang | H010013A | 4963 |

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EXAMINER

ESTRADA, ANGEL R

ART UNIT PAPER NUMBER

2831

DATE MAILED: 04 23 2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/986,175

Applicant(s)

CHANG, CHIH-CHIN

Examiner

Angel R. Estrada

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 12-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 November 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/855,711.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the fabrication of the FED cathode showing all the steps claimed in claims 12-20 must be shown (as the prior art shows in figure 2a-2e all the step of forming the FED) or the feature(s) canceled from the claim(s). No new matter should be entered.

The drawings must show the FED cathode structure with the all the layers, the etching, sloping, joining, and sealing process; the step of forming a microtip and the lifting process.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "13" and "15" have both been used to designate the conductor in figure 3.

Specification

3. The disclosure is objected to because of the following informalities:

a) In page 6 line 9 states that the dielectric layers 16a and 16b are composed of Nb. Nb (Niobium) is a metallic element and is not dielectric.

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b) In page 6 line 15 states that "the metal layer is covered over the first gate line the internal via and the metal layer", confusing and unclear. How the metal layer cover itself

c) Claim 15 recites that the gate lines are composed of niobium (Nb); however the specification does not provide support of the gate lines being made of Nb.

Appropriate correction is required.

Claim Objections

4. Claim 12 and 20 are objected to because of the following informalities:

a) Claim 12 line 1, change "FED" for --Field Emission Display (FED)--

b) Change the dependency of Claim 20 from "22" to --19--, since claim 22 does not exists.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 12-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 12 line 7, "the hole", lacks antecedent basis.

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Claim 12 line 13-14, "including the connection of the internal via and the microtip concurrently completed", confusing and unclear.

Claim 14 line 1-2, "the doped silicon", lacks antecedent basis.

Claim 15 lines 2-3, "the cathode conductor", lacks antecedent basis.

Claim 16 line 2, "the tape line", lacks antecedent basis.

Claims 13 and 17-20 are included because of their dependency.

Any further rejections of claims 12-20 in this office action are based on claims 12-20, as they are understood by the examiner.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12, 16, 17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's prior art (Figure 1-2e).

Regarding claim 12, the applicant's prior art (figures 1-2e) discloses a fabrication method for the FED cathode plate with an internal via (see figure 1), comprising the steps: depositing an FED cathode structure from bottom to top including a substrate (10), a resistive layer (11), a dielectric layer (16), and a gate line (5); etching the cathode structure to form a cathode plate with a hole (4) and cavity of a microtip (3), an internal via (see figure 1), and a contact (7); sloping

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the plate to a predetermined angle (see figure 2c) to form a metal layer (19) by evaporation (page 2 line 13-15), wherein the predetermined angle is ranged between 10 to 30 degrees (see figure 2c); forming a microtip (2) within the microtip cavity (3) by vertical layer evaporation (page 2 line 15-18),; and lifting off the excessive deposition on the surface of the plate by immersing the plate in a chemical solution. (page 2 line 18-21); but the applicant's prior art lacks the hole of the cathode plate being about 1.6 μ m wide. It would have been an obvious matter of design choice to change the size of the cathode plate hole to about 1.6 μ m wide, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. In re. Rose, 105 USPQ 237 (CCPA 1955).

Regarding claim 16, the applicant's prior art discloses the fabrication method (see figure 1 and 2a-2d), wherein chromium-including metal (page 2 line 30-31) is used to form the tape line (18).

Regarding claim 17, the applicant's prior art discloses the fabrication method (see figure 1 and 2a-2e), wherein SiO₂ is used to form the dielectric layer (page 2 line 34- page 3 line 1).

Regarding claim 19, the applicant's prior art discloses the fabrication method (see figure 1 and 2a-2d) further comprising the step of joining and sealing the completed cathode plate to an anode with an adhesive (page 2 line 21-25).

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Regarding claim 20, the applicant's prior art discloses the fabrication method (see figure 1 and 2a-2d), wherein the adhesive is glass frit (page 2 line 21-25).

7. Claims 13, 14 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's prior art (Figure 1-2e) in view of Kishino et al (US 6,133,678)

Regarding claim 13, the applicant's prior art discloses the claimed invention except for the substrate being glass. Kishino et al teaches a field emission element having a glass substrate (1 and see column 2 lines 24-26). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the applicant's prior art's substrate of glass as taught by Kishino et al, since it is well known in the art that glass has a high thermal durability.

Regarding claim 14, the applicant's prior art discloses the claimed invention except for the resistive layer being a doped silicon layer. Kishino et al teaches a field emission element having a resistive layer (3) being a doped silicon layer (column 2 line 24-26). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the applicant's prior art's resistive layer of doped silicon as taught by Kishino et al to enable formation of the resistive layer.

Regarding claim 18, the applicant's prior art discloses the claimed invention except for microtip being made of molybdenum-including metal.

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Kishino et al teaches a field emission element having a microtip (5) being made of a molybdenum-including metal (column 2 line 35-36). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the applicant's prior art's microtip of a molybdenum-including metal as taught by Kishino et al to enable formation of the microtip.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's prior art (Figure 1-2e) in view of Kishino et al (US 6,133,678) and Baldi (US 6,000,980).

Regarding claim 15, the applicant's prior art discloses the claimed invention except for the cathode conductor, the gate line and the metal layer being made of a niobium including metal. Kishino et al teaches a field emission element having a gate line (column 7 line 20-21), and the metal layer being made of a niobium including metal (column 7 line 27-30). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the gate line and the metal layer of a niobium including metal as taught by Kishino et al to improve the electrical conductivity in the FED due to niobium super conductivity characteristics. The modified applicant's prior art discloses the claimed invention except for the cathode conductor being made of niobium. Baldi et al teaches a FED having a cathode conductor that can be made of any of various low-resistivity metals including niobium (column 3 line 21). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide to the modified applicant's prior art with a cathode conductor being

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made of niobium as taught by Baldi to improved the electrical conductivity in the FED due to niobium super conductivity characteristics.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Levine et al (US 5,621,272), Jones et al (US 5,886,460), Lee (US 5,277,638), Lin et al (US 5,820,433), Chan et al (US 5,893,787), Bothra et al (US 6,045,425), Raina et al (US 6,425,791), Chang et al (US 6,062,931), Huang et al (US 5,461,009 and US 5,543,686), Liu et al (US 5,683,282), Liu (US 5,509,839 and US 5,723,052), Jones et al (US 5,663,608), Curtin et al (US 5,686,790) and Tomita et al (US 6,218,778) and Jeng et al US 5,772,485) discloses a method for fabrication a field emission element (FED).

10. Any inquiry concerning this communication should be directed to Angel R. Estrada at telephone number (703) 305-0853. The Examiner can normally be reached on Monday-Friday (8:30 -5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dean Reichard can be reached on (703) 308-3682. The fax numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for after final communication.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

AE

April 17, 2003

Dean A. Reichard 4/21/03

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